CLAIMS

1. A device for concentrating particles, the device comprising:

a. a channel having an inlet and first and second outlets;

b. a first sieve disposed between the inlet and the first outlet, wherein the first sieve is not disposed between the inlet and the second outlet; and

c. a force generator to direct particles to the first sieve.

2. The device of claim 1, wherein the force generator produces a greater flow rate through the first outlet than the second outlet.

3. The device of claim 1, wherein the sieve is disposed in a region of the channel, and wherein the force generator comprises a channel widening at a point in the region containing the sieve such that fluid entering the region is drawn through the sieve.

4. The device of claim 3, wherein the pressure drop along the length of the sieve in the direction of flow between the inlet and the second outlet is substantially constant.

5. The device of claim 1, further comprising a third outlet and a second sieve disposed between the inlet and the third outlet, wherein the sieves are disposed in a region of the channel, and wherein the force generator comprises a channel widening at a point in the region containing the sieves such that fluid entering the region is drawn through the sieves.

6. The device of claim 5, wherein the pressure drop along the length of the sieves in the direction of flow between the inlet and the second outlet is substantially constant.

7. The device of claim 1, wherein the force generator comprises two electrodes, wherein the first sieve is disposed between the electrodes such that, when a DC voltage is applied to the electrodes, charged particles are capable of being moved to or away from the first sieve by electrophoresis.

8. The device of claim 1, wherein the force generator comprises two or more electrodes capable of producing a non-uniform electric field such that particles are capable of being moved to or away from the first sieve by dielectrophoresis.

9. The device of claim 1, wherein the force generator comprises a curved channel, such that particles are capable of being moved to the first sieve by centrifugal force.

10. The device of claim 1, wherein the first sieve allows passage of maternal red blood cells but not fetal red blood cells.

11. A method of producing, from a particle-containing fluid, a sample enriched in a target population of particles, the method comprising the steps of:

a. providing a device comprising:
   i. a channel having an inlet and a first and a second outlet; and
   ii. a first sieve disposed between the inlet and the first outlet, wherein the first sieve is not disposed between the inlet and the second outlet; and
   iii. a force generator to direct particles to the first sieve;
b. directing the particle-containing fluid through the inlet into the channel;

c. actuating the force generator so that particles in the fluid are directed to the first sieve and do or do not substantially pass through the first sieve based on the size, shape, or deformability of the particles; and

d. collecting the effluent containing particles of the target population from the first outlet if the particles of the target population substantially pass through the first sieve or from the second outlet if the particles of the target population do not substantially pass through the first sieve, thereby producing the sample enriched in the target population of particles.

12. The method of claim 11, wherein said force generator produces a greater flow rate through the first outlet than the second outlet.

13. The method of claim 11, wherein the sieve is disposed in a region of the channel, and wherein the force generator comprises a channel widening at a point in the region containing the sieve such that fluid entering the region is drawn through the sieve.

14. The method of claim 13, wherein the pressure drop along the length of the sieve in the direction of flow between the inlet and the second outlet is substantially constant.

15. The method of claim 11, wherein the device further comprises a third outlet and a second sieve disposed between the inlet and the third outlet, wherein the sieves are disposed in a region of the channel, and wherein the force generator comprises a channel widening at a point in the region containing the sieves such that fluid entering the region is drawn through the sieves.

16. The method of claim 15, wherein the pressure drop along the length of the sieves in the direction of flow between the inlet and the second outlet is substantially constant.

17. The method of claim 11, wherein the device further comprises a third outlet and a second sieve disposed between the inlet and the third outlet, wherein the sieves are disposed in a region of the channel, and wherein the force generator comprises a channel widening at a point in the region containing the sieves such that fluid entering the region is drawn through the sieves.

18. The method of claim 11, wherein the force generator comprises two electrodes, wherein the first sieve is disposed between the electrodes such that, when a DC voltage is applied to the electrodes, charged particles are capable of being moved to or away from the first sieve by electrophoresis.

19. The method of claim 11, wherein the force generator comprises electrodes capable of producing a non-uniform electric field such that particles are capable of being moved to or away from the first sieve by dielectrophoresis.

20. The method of claim 11, wherein the force generator comprises a curved channel, such that particles are capable of being moved to the first sieve by centrifugal force.

21. The method of claim 11, wherein said target population comprises fetal red blood cells.